September 16, 2005

Vicente Santa Cruz, Ph.D.
Product Stewardship, Toxicology
Chevron Phillips Chemical Company LP
10001 Six Pines Drive
Suite 4103
The Woodlands, TX 77380

Dear Dr. Santa Cruz:

The Office of Pollution Prevention and Toxics is transmitting EPA's comments on the robust summaries and test plan for the Di-tertiary (C9-C12) Alkyl Polysulfides Category posted on the ChemRTK HPV Challenge Program Web site on May 18, 2004. I commend Chevron Phillips Chemical Company LP for its commitment to the HPV Challenge Program.

EPA reviews test plans and robust summaries to determine whether the reported data and test plans will provide the data necessary to adequately characterize each SIDS endpoint. On its Challenge Web site, EPA has provided guidance for determining the adequacy of data and preparing test plans used to prioritize chemicals for further work.

EPA will post this letter and the enclosed comments on the HPV Challenge Web site within the next few days. As noted in the comments, we ask that Chevron Phillips advise the Agency, within 60 days of this posting on the Web site, of any modifications to its submission. Please send any electronic revisions or comments to the following e-mail addresses: oppt.ncic@epa.gov and chem.rtk@epa.gov.

If you have any questions about this response, please contact Mark Townsend, Acting Chief of the HPV Chemicals Branch, at 202-564-8617. Submit questions about the HPV Challenge Program through the "Contact Us" link on the HPV Challenge Program Web site pages or through the TSCA Assistance Information Service (TSCA Hotline) at (202) 554-1404. The TSCA Hotline can also be reached by e-mail at tsca-hotline@epa.gov.

I thank you for your submission and look forward to your continued participation in the HPV Challenge Program.

Sincerely,

/S/

Oscar Hernandez, Director
Risk Assessment Division

Enclosure

cc: N. Patel
J. Willis

EPA Comments on Chemical RTK HPV Challenge Submission:
Di-tertiary (C9-C12) Dialkyl Polysulfides Category

Summary of EPA Comments

The sponsors, Chevron Phillips Chemical Company LP and ATOFINA Chemicals, submitted a test plan and robust summaries to EPA for the Di-tertiary (C9-C12) Dialkyl Polysulfides category dated April 29, 2004. EPA posted the submission on the ChemRTK HPV Challenge Web site on May 18, 2004. The proposed category consists of di-*t*-nonyl polysulfide (CAS No. 68425-16-1), di-*t*-dodecyl pentasulfide (CAS No. 31565-23-8), and di-*t*-dodecyl polysulfides (CAS Nos. 68425-15-0 and 68583-56-2).

EPA has reviewed this submission and has reached the following conclusions:

1. General Comment. The submitter needs to resolve test substance identity discrepancies in the robust summaries.

2. Category Definition and Justification. The category is clearly defined. Structural similarities and other available information support the proposed grouping of these polysulfides.

3. Physicochemical Properties. EPA agrees with the submitter's plan to test for all physicochemical endpoints for di-*t*-nonyl polysulfide.

4. Environmental Fate. The data provided by the submitter for photodegradation and fugacity are adequate for the purposes of the HPV Challenge Program. The submitter needs to provide a technical statement in a robust summary for stability in water. EPA reserves judgement on the adequacy of data submitted for the biodegradation endpoint pending the receipt of additional information.

5. Health Effects. Adequate data were provided for the acute, genetic, repeated-dose and developmental toxicity endpoints. Although no data were submitted to address the reproductive toxicity endpoint, EPA believes that, on a weight-of-evidence basis, for the purposes of the HPV Challenge Program no significant new information would be gained by further testing. The submitter needs to address deficiencies in the robust summaries.

6. Ecological Effects. EPA reserves judgement on the adequacy of data submitted for fish, invertebrates, and algae, pending results from the proposed water solubility test. However, additional testing of these endpoints may not be necessary because of the high estimated log K_{ow} values for these alkyl polysulfides.

EPA requests that the submitter advise the Agency within 60 days of any modifications to its submission.

EPA Comments on the Di-tertiary (C9-C12) Dialkyl Polysulfides Category
Challenge Submission

Category Definition and Justification

The proposed category consists of three substances containing dialkyl polysulfides with sulfur chain lengths of 2-8 atoms. The ends of the sulfur atom chains are terminated with highly branched C9 (di-*t*-nonyl) or C12 (di-*t*-dodecyl) alkyl groups. Each substance is a "range of mixtures of isomers." Apparently, each disulfide, trisulfide, etc. component is a mixture of isomers as a result of the isomeric alkyl substituent structures present. The proposed category includes one sponsored substance, di-*t*-nonyl polysulfide, and two non-HPV substances, di-*t*-dodecyl pentasulfide and di-*t*-dodecyl polysulfides.

The submitter justifies the category by expected similarities in the physicochemical, environmental, and toxicological properties of the C9 and C12 dialkyl polysulfides, concluding that the extremely hydrophobic and sorptive properties of these compounds will limit their bioavailability, resulting in low toxicities to mammalian species and aquatic organisms.

EPA agrees that the data and estimated values provided for the physicochemical, environmental fate and health effects endpoints support the grouping of the polysulfides into a category.

There is an error in the chemical structure for di-*t*-dodecyl pentasulfide on page 8 of the test plan. The alkyl groups have only nine carbons rather than the 12 indicated by the name. Furthermore, the depiction of specific alkyl group structures conflicts with the statements in the text about their complex nature.

Chemical names do not correspond to CAS numbers in several of the robust summaries for di-*t*-dodecyl pentasulfide (see Specific Comments on the Robust Summaries below).

Test Plan

Physicochemical Properties (melting point, boiling point, vapor pressure, partition coefficient and water solubility)

EPA agrees with the submitter's plan to test for all physicochemical endpoints for di-*t*-nonyl polysulfide.

Environmental Fate (photodegradation, stability in water, biodegradation, fugacity)

The data provided by the submitter for photodegradation and transport between environmental compartments are adequate for the purposes of the HPV Challenge Program.

Stability in water. Although EPA agrees with the submitter's conclusion that this chemical does not hydrolyze because it lacks water-sensitive functional groups, the submitter needs to incorporate a technical statement to this effect in a robust summary.

Biodegradation. EPA reserves judgement on the adequacy of submitted biodegradation data pending the receipt of more information. The submitted ultimate biodegradation data suggest that these substances are not readily biodegradable. However, the initial test concentration reported by the submitter in both tests was 800 mg/L, considerably higher than the 2 to 10 mg/L recommended in OECD TG 301D. The submitter needs to explain why such a high concentration was used, and what impact, if any, this had on the viability of the bacteria used in the test, and consequently on the validity of the generated data. The results of these tests could have been due to toxicity to the microorganisms at the high concentrations tested rather than lack of biodegradation potential (no toxicity controls or positive controls were reported). If additional data and a valid reason for the high test concentrations are available, the submitter should incorporate them in the robust summaries. Otherwise, the submitter needs to conduct a ready biodegradation test with proper controls and within the appropriate concentration range.

Health Effects (acute toxicity, repeated-dose toxicity, genetic toxicity, and reproductive/developmental toxicity)

Adequate data were provided for the acute, genetic, repeated-dose and developmental toxicity endpoints. Although no data were submitted to address the reproductive toxicity endpoint, EPA believes that for the purposes of the HPV Challenge Program no significant new information would be gained by further testing. The submitter needs to address deficiencies in the robust summaries.

Reproductive toxicity. No data were submitted for this endpoint. The submitter proposed addressing this endpoint with (1) a 90-day repeated-dose toxicity study (OECD TG 408) to be conducted on di-*t*-nonyl polysulfides in rats, with a focus on reproductive organs, and (2) the existing developmental toxicity study.

However, EPA believes that, for the purposes of the HPV Challenge Program, the weight of the evidence indicates that no significant new information would be gained by testing for this endpoint: no effects were observed at 1000 mg/kg/day, the highest dose tested, in both an adequate 28-day repeated-dose study and a developmental toxicity study (OECD TG 414) on one category member, and genetic toxicity studies on two substances were negative. The submitter needs to incorporate available data on the reproductive organs from the 28-day repeated-dose study into a robust summary for reproductive toxicity.

Ecological Effects (fish, invertebrates, and algae)

EPA reserves judgement on the adequacy of data submitted for fish, invertebrates, and algae, pending receipt of the results of the proposed water solubility test. Because various solubility limits are given for the submitted studies, measured water solubility data are needed to evaluate their adequacy. However, because estimated log K_{ow} (EPWIN) values for the alkyl polysulfides are >8 (e.g., 9.14 for di-*t*-nonyl polysulfide with S = 3 and 11.86 for di-*t*-dodecyl polysulfide with S = 5), additional testing may be unnecessary.

Specific Comments on the Robust Summaries

General Comment

In the robust summaries/IUCLID data set for di-*t*-dodecyl pentasulfide (CAS No. 31565-23-8), the test substance listed for many of the studies is di-*t*-dodecyl polysulfide, identified in the test plan as having CAS Nos. 68583-56-2 & 68425-15-0. In other studies, di-*t*-dodecyl dodecyl) pentasulfide is listed as the test substance, but with the CAS number, 68425-15-0, for di-*t*-dodecyl polysulfide. Also, in the gene mutation robust summary under di-*t*-dodecyl pentasulfide, di-*t*-dodecyl polysulfide is listed as the test substance, but with the CAS No. for di-*t*-nonyl polysulfide. The submitter needs to resolve such discrepancies.

Health Effects

Acute toxicity. Missing study details in the robust summary for the acute oral toxicity of di-*t*-nonyl polysulfide include test substance purity, method of administration (e.g., gavage), number of rats per sex and dose group showing signs of toxicity, gross necropsy results, if performed at sacrifice, and method of LD_{50} calculation.

Repeated-dose toxicity. Missing study details in the robust summary for the 28-day oral gavage study of CAS No. 31565-23-8 (identified as di-*t*-dodecyl polysulfide) include test substance purity, specific hematology, clinical chemistry and urinalysis data, and specific organs weighed or examined for gross and microscopic pathology.

Genetic toxicity (*Gene mutations*). Missing study details in the robust summary for CAS No. 68425-16-1 (identified as di-*t*-nonyl polysulfide) include test substance purity, incubation conditions (e.g., temperature and duration), number of colonies counted per dose level, mean number of revertent colonies per plate for treated and control cultures, and statistical methods.

Genetic toxicity (Chromosomal aberrations). Missing study details in the robust summary for di-*t*-nonyl polysulfide include test substance purity, metaphase-arresting substance, number of metaphases scored per concentration, criteria for scoring aberrations and a positive response, whether or not control cultures gave the appropriate response, number of cells with chromosome aberrations, and type of chromosome aberrations for each treated and control culture.

Developmental toxicity. Missing study details in the robust summary for CAS No. 31565-23-8 (identified as di-*t*-dodecyl polysulfide) include test substance purity, and the proportion of fetuses examined for internal and skeletal variations and malformations.

Ecological Effects

Fish. Missing study details include test substance purity, concentrations tested, fish loading, water hardness, and total organic carbon (TOC).

Invertebrates. Missing study details include test substance purity, water hardness, and TOC.

Algae. Missing study details include test substance purity.

Followup Activity

EPA requests that the submitter advise the Agency within 60 days of any modifications to its submission.